DMC-41x3 Integrated Amplifier Installation Manual

Manual Rev. 1.0a3

By Galil Motion Control, Inc.

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Using This Manual

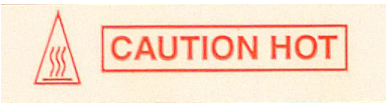
This manual provides information for the wiring, installation, powering-up, and basic communication to the DMC-41x3 motion controller with the Galil internal amplifiers, AMP-435x0 and AMP-432x0. The following list of part numbers are examples of configurations of the DMC-41x3 motion controller that are covered in this manual.

DMC-41x3
DMC-41x3-D3220
DMC-41x3-D3240
DMC-41x3-D3520
DMC-41x3-D3540
DMC-41x3-D3240-D3220
DMC-41x3-D3240-D3240
DMC-41x3-D3540-D3520
DMC-41x3-D3540-D3540
DMC-41x3-D3240-D3520
DMC-41x3-D3240-D3540
DMC-41x3-D3540-D3220
DMC-41x3-D3540-D3240

This manual covers the basic installation of the controller and amplifier modules. For full operational information including specific I/O installation, detailed programming examples and additional internal driver information, see the DMC-41x3 User Manual.

WARNING: Machinery in motion can be dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the machinery. Galil shall not be liable or responsible for any incidental or consequential damages.

If the DMC-41x3 motion controller and included amplifiers or stepper drivers are not used in a manner specified by Galil Motion Control, the protection provided by the controller, amplifiers and drivers may be impaired.



Caution:
The DMC-41x3 controller with internal servo amplifiers contain hot surfaces.

Chapter 1 Overview

Introduction

DMC-41x3 Motion Controller

The DMC-41x3 Series are Galil's Econo motion controller that is a scaled-down version of the DMC-40x0 Acclerra series controller. The controller series offers many enhanced features compared to prior generation Econo series controllers including high speed communications, non-volatile program memory, faster encoder speeds, and improved cabling for EMI reduction.

Each DMC-41x3 provides two communication channels: a high speed 100BaseT Ethernet connection and a USB programming port. There is an auxiliary RS-232 port that can be used to communicate to external devices such as HMI's. The controllers allow for high-speed servo control up to 15 million encoder counts/sec and step motor control up to 3 million steps per second. Sample rates as low as 62 µsec per axis are available.

A Flash EEPROM provides non-volatile memory for storing application programs, parameters, arrays and firmware. New firmware revisions are easily upgraded in the field.

The DMC-41x3 is available with up to eight axes in a single stand alone unit. The DMC-4113, 4123, 4133, 4143 are one thru four axes controllers and the DMC-4153, 4163, 4173, 4183 are five thru eight axes controllers. All eight axes have the ability to use Galil's integrated amplifiers or drivers and connections for integrating external devices.

Commands are sent in ASCII. Additional software is available for automatic-tuning, trajectory viewing on a PC screen, and program development using many environments such as Visual Basic, C, C++ etc. Drivers for Windows XP, Vista and 7 (32 & 64 bit) as well as Linux are available.

AMP-43220/43240 Servo Amplifier (-D3220/-D3240)

The AMP-43240 and AMP-43220 amplifiers reside inside the DMC-41x3 enclosure. The AMP-43240 contains four transconductance, PWM amplifiers for driving brushless or brush-type servo motors (the AMP-43240 contains 2 amplifiers). Each amplifier drives motors operating at up to 10 Amps continuous, 20 Amps peak, 20–60 VDC. The gain settings of the amplifier are user-programmable at 0.5 Amp/Volt, 1.0 Amp/Volt and 2.0 Amp/Volt. The switching frequency is 24 kHz. The drive operates in a Chopper Mode. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. Two AMP-43240s or AMP-43220's can be used in 5- thru 8-axis controllers.

AMP-43520/43540 Servo Amplifier (-D3520/-D3540)

The AMP-43540 and AMP-43520 amplifies reside inside the DMC-41x3 enclosure. The AMP-43540 contains four sinusoidally commutated, PWM amplifiers for driving brushless servo motors (the AMP-43520 contains 2 amplifiers). Each amplifier drives motors operating at up to 8 Amps continuous, 15 Amps peak, 20–60 VDC. The gain settings of the amplifier are user-programmable at 0.4 Amp/Volt, 0.8 Amp/Volt and 1.6 Amp/Volt. The switching frequency is 33 kHz. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. Two AMP-43540s or AMP-43520's can be used for 5- thru 8-axis controllers.

Chapter 2 Installation

Pre-Installation

Operating Environment

The location for use of the DMC-41x3, AMP-432x0 and AMP-435x0 must meet the following requirements.

Description	Units	Specification
Ambient Temperature	C	0 to +40
Altitude	feet	10,000
Humidity	RH	20-95% (non-condensing)

Mounting Location

The DMC-41x3 motion controller must be mounted on a flat surface using the 4 mounting holes found on the metal base-plate. The grating found on the side of the metal must not be obstructed in order provide proper air flow for adequate heat dissipation. The dimensions for a 1-4 axis controller are smaller than that of a 4-8 axis controller, these dimensions and the mounting hole locations are found in Appendices A3 and A4.

Additional Mounting Consideration when using the AMP-43xx0

When operating a DMC-41x3- D3xx0-D3xx0 or a DMC-41x3-D3xx0, special mounting considerations must be made if the total continuous current output for the controller is greater than 15A for a 1-4 axis controller and greater than 30A for a 5-8 axis controller. In this case, the controller base must be mounted to an addition heat sink.

When the application requires that the DMC-41x3-D3xx0-D3xx0 be mounted to a heat sink, the heat sink must be sized such that the base of the DMC-41x3 be kept at a temperature of 65^{O} C or below. This works out to a thermal resistance of 0.2^{O} C/W at full continuous power. Full continuous power is defined as a 100% duty cycle with all 8 axis running 10Amps continuous current (80 Amps total), with a 60VDC bus.

Elements Needed for Installation

1. Isolated DC power supply
    a. Ratings found in Appendix A1
2. Power Supply Cable
    a. Cable from DC power supply to power input for AMP-43xx0.
    b. DMC-4183 controller requires 2 cables.
3. PC or laptop with Ethernet and/or USB ports
4. GalilTools, or GalilTools-Lite software package
5. Ethernet Cable
    a. Recommended shielded Cat 5 STP cable. Straight-through or Cross-over.
6. Male Type A – Male Type B USB cable
7. Molex pin Crimp Tool
8. Additional cables may be required for connection to motors, external amplifiers, digital or analog I/O, and other devices. See the full DMC-41x3 User Manual for further information.
9. Disconnect switch or circuit breaker for AC power to DC Power Supply

Unpacking the Controller

Caution: The DMC-41x3 motion controller and included internal amplifier include electrostatic sensitive components. Observe standard precautions for handling ESD sensitive devices when handling the controller.

1. Verify that the following components have been shipped along the motion controller.
    - Connectors and mating pins for motor power and amplifier power.
        - Qty 4 – 4 pin molex connectors for EACH internal amplifier
        - Qty 1 – 6 pin molex connector for EAH internal amplifier
    - Galil Software Installation CD

    Note: Connectors and/or software installation CD may not be shipped to existing OEM customers.
2. Check that no visible damage has occurred to the controller, or internal amplifiers. If any damage has occurred to the controller, or the components shipped with the controller, contact Galil Motion Control immediately. Contact information can be found in the beginning of this manual.
3. Verify the controller that has been shipped to you is in fact the controller that you have ordered from Galil or your authorized Galil distributor. To do this, check the labeling on the controller and compare it to the part number that was ordered.

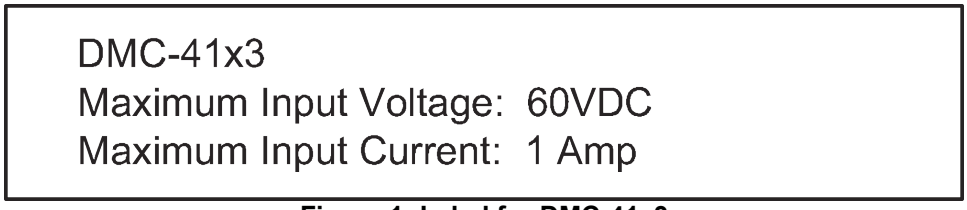


Figure 1: Label for DMC-41x3

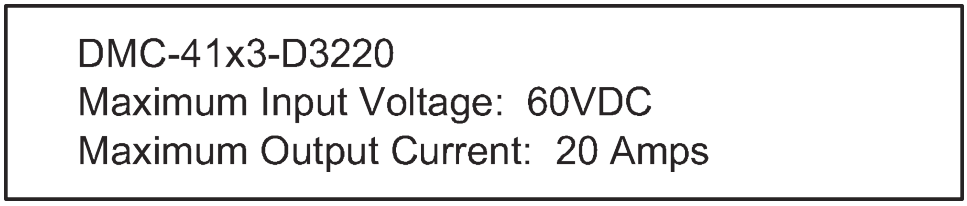


Figure 2: Label for DMC-41x3-D3220

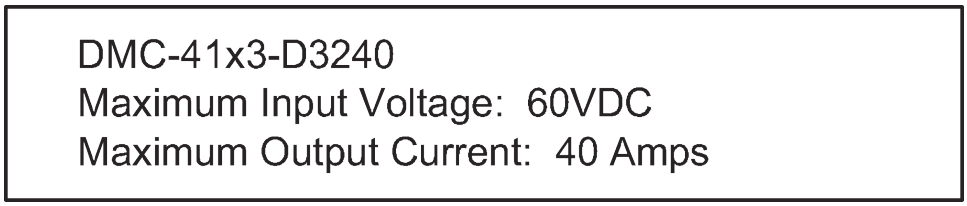


Figure 3: Label for DMC-41x3-D3240

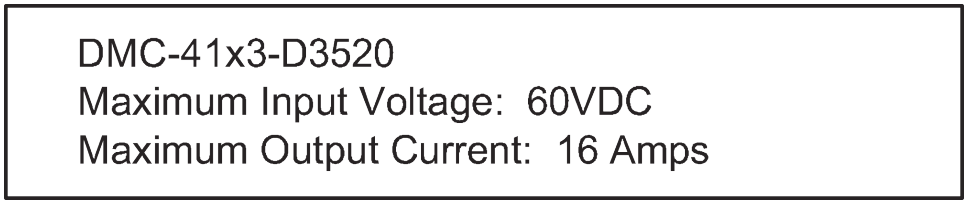


Figure 4: Label for DMC-41x3-D3520

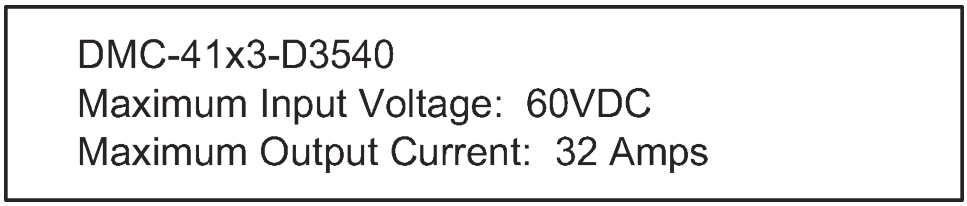


Figure 5: Label for DMC-41x3-D3540

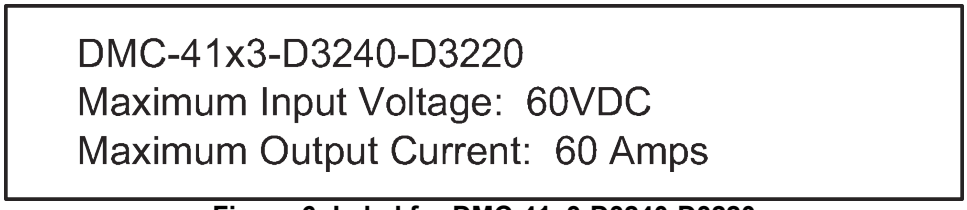


Figure 6: Label for DMC-41x3-D3240-D3220

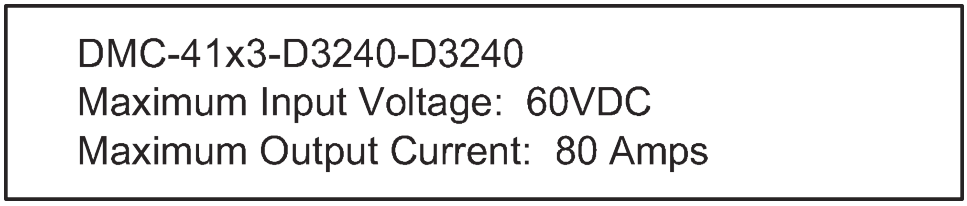


Figure 7: Label for DMC-41x3-D3240-D3240

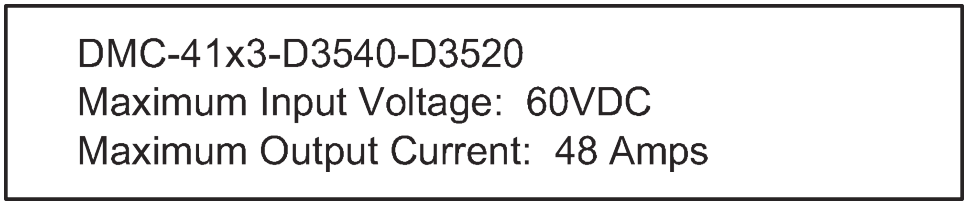


Figure 8: Label for DMC-41x3-D3540-D3520

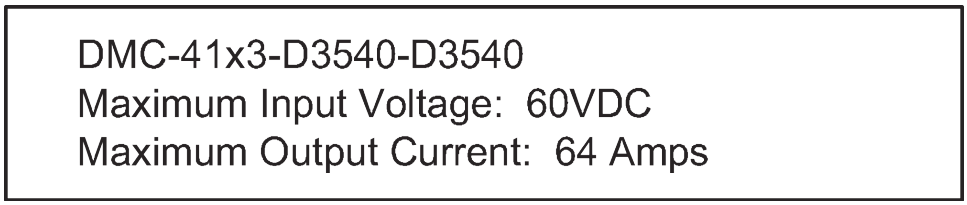


Figure 9: Label for DMC-41x3-D3540-D3540

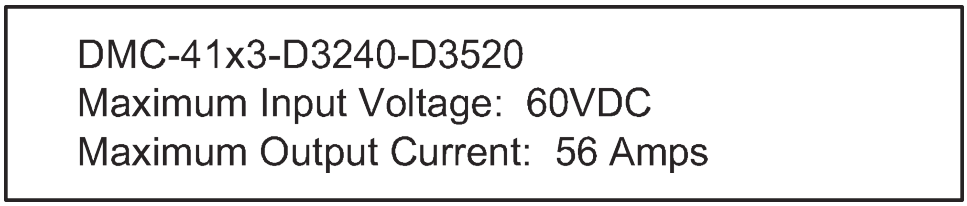


Figure 10: Label for DMC-41x3-D3240-D3520

DMC-41x3-D3240-D3540
Maximum Input Voltage: 60VDC
Maximum Output Current: 72 Amps

Figure 11: Label for DMC-41x3-D3240-D3540

DMC-41x3-D3540-D3220
Maximum Input Voltage: 60VDC
Maximum Output Current: 52 Amps

Figure 12: Label for DMC-41x3-D3540-D3220

DMC-41x3-D3540-D3240
Maximum Input Voltage: 60VDC
Maximum Output Current: 72 Amps

Figure 13: Label for DMC-41x3-D3540-D3240

Figure 14: ETL Mark

Installation

Mounting the Controller

The DMC-41x3 motion controller must be mounted to a flat surface with 4 – #10 pan head screws through each mounting hole found on the controller base as shown in Figure 15. If the controller is mounted on a wall, the controller should be mounted so that the bottom of the controller is horizontal to the floor (as shown in Figure 15). The enclosure must meet or exceed any fire ratings that are required of the system as a whole.

If the AMP-43xx0 internal amplifiers are being used, it should be determined at this time whether or not an additional heat sink will be required. This is determined based upon the continuous current requirements of the system as defined in the "Additional Mounting Consideration when using the AMP-43xx0" section above. The Motor Sizer tool found on our website can be used to determine this value http://www.galilmc.com/learning/motorsizer.php.

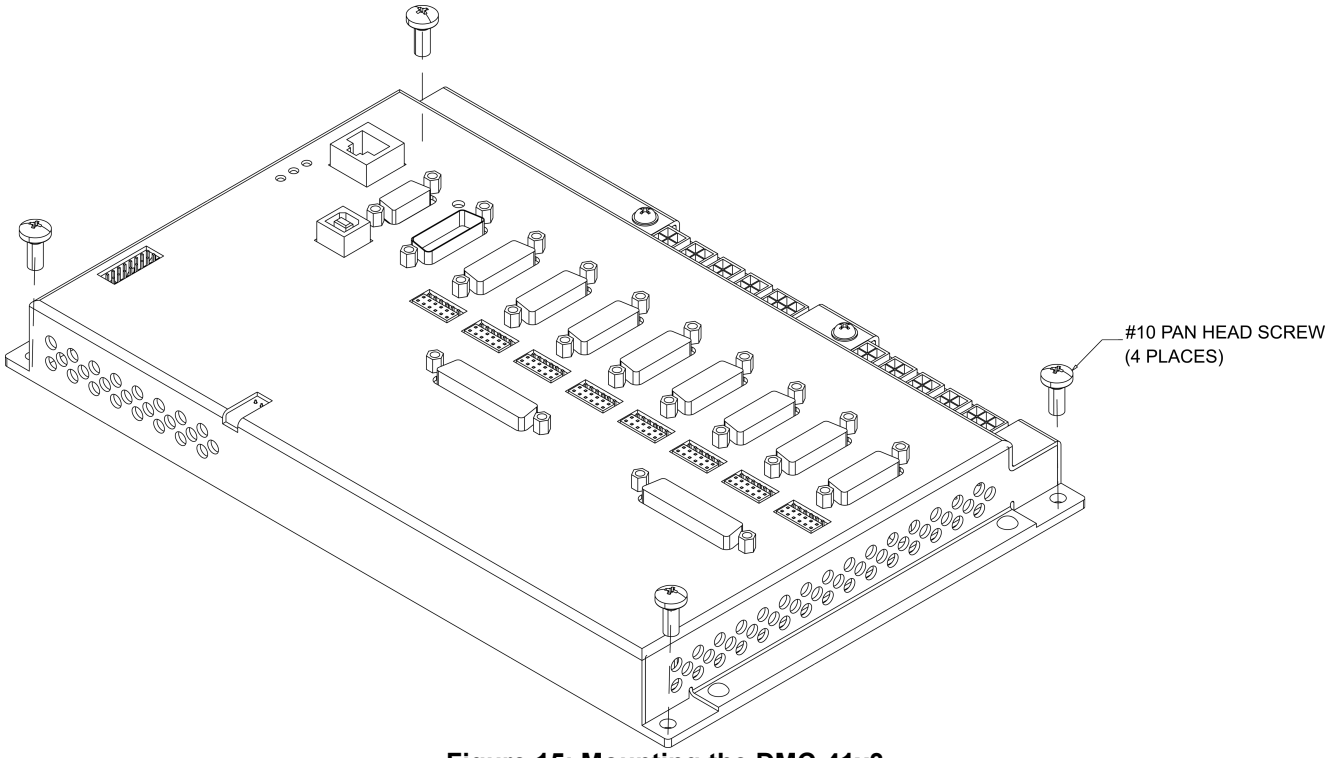


Figure 15: Mounting the DMC-41x3

Powering the Controller

The DMC-41x3 is powered via the DC supply connections. All connectors share a common ground. The DMC-41x3 is grounded through the metal enclosure and should be installed on an unpainted metal surface. The Earth lugs should be used for additional electrical contact.

Wiring the Controller with internal AMP-43xx0

The basic wiring for a DMC-41x3 motion controller with included AMP-43xx0 servo amplifiers is shown in Figure 16. The disconnect switch or circuit breaker for AC power must be installed in a location that meets the following requirements:

- Placed in close proximity to the equipment, within easy reach of the operator, and must not block the installation of the controller
- Marked as the disconnect device for the equipment

Connectors for AMP-43xx0

	On Board Connector	Terminal Pins
POWER	6-pin MATE-N-LOK MOLEX# 39-31-0060	MOLEX#44476-3112
A,B,C,D: 4-pin Motor Power Connectors	4-pin MATE-N-LOK MOLEX# 39-31-0040	MOLEX#44476-3112

For mating connectors see http://www.molex.com/

Power Connector Motor Connector

Power Connector	
Pin Number	Connection
1,2,3	DC Power Supply Ground
4,5,6	+VS (DC Power)
Motor Connector - AMP-432x0	
1	Phase C (N/C for Bushed Motors)
2	Phase B
3	No Connect
4	Phase A
Motor Connector - AMP-435x0	
1	Phase C
2	Phase B (N/C for Bushed Motors)
3	No Connect
4	Phase A

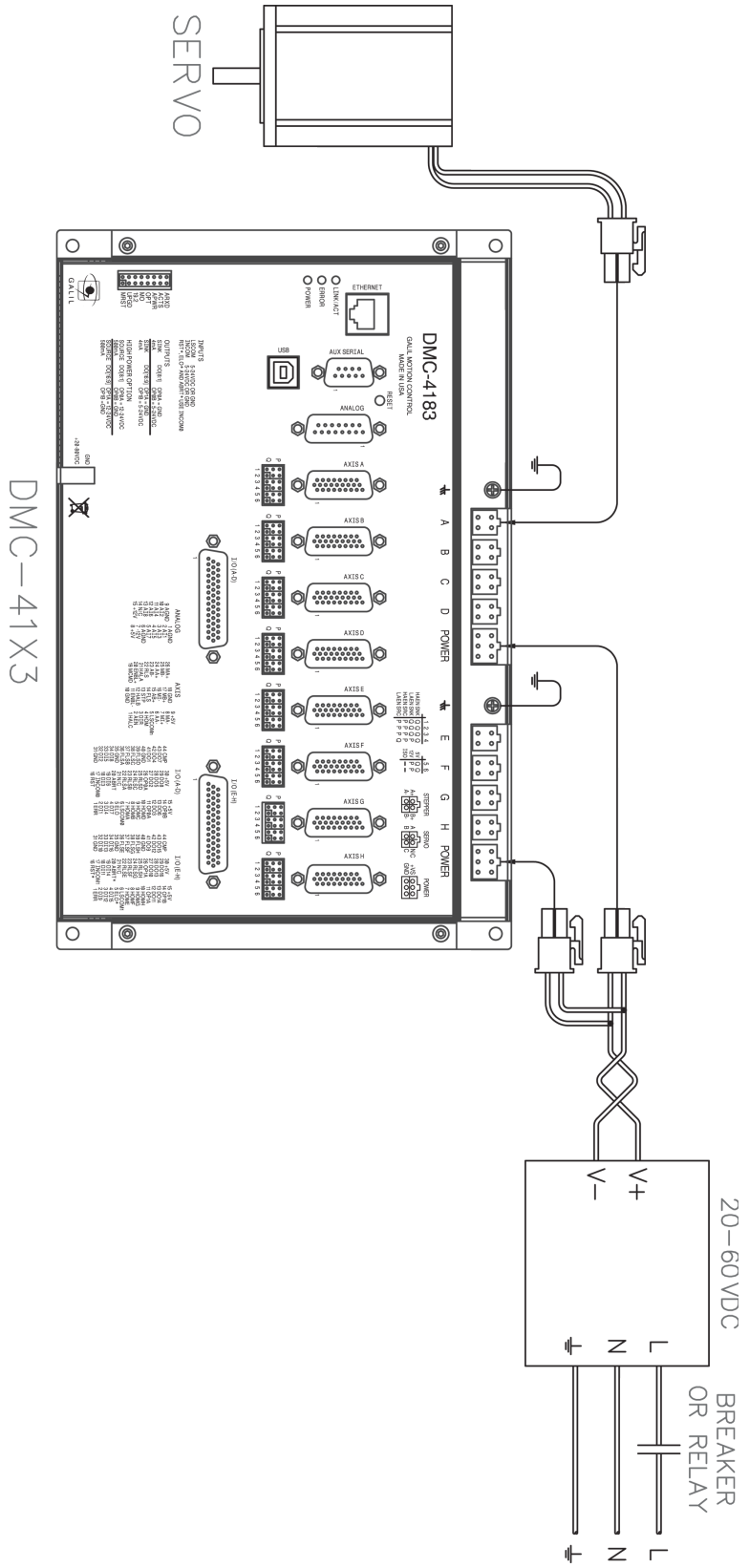


Figure 16: DMC-41x3 wiring with AMP-43xx0

Communication Connection

Connect the serial cable or the Ethernet cable from your PC to the DMC-41x3 motion controller. The Ethernet cable may be connected through a hub or switch, or directly to the PC.

If the controller is connected to a DHCP enabled network, the IP address will automatically be assigned to the controller.

Powering the Controller

Once the connections have been made from the DC power supply to the DMC-41x3 motion controller, the controller and internal amplifiers may be powered-up. At this time the Power LED should be illuminated.

Additional Wiring

Additional wiring to the Analog and Digital I/O, encoders, limit switches and other connections found on the D-Subs on the DMC-41x3 motion controller will be required to complete your applications. The pinout for the connectors are shown below, for additional information regarding these connections, see the DMC-41x3 User Manual.

J5 - I/O (A-D) 44 pin HD D-Sub Connector (Female)

Pin#	Label	Description	Pin#	Label	Description	Pin#	Label	Description
1	ERR	Error Output	16	RST	Reset Input	31	GND	Digital Ground
2	DI1	Digital Input 1/ A latch	17	INCOM0	Input Common (DI 1-8)	32	DI2	Digital Input 2 / B latch
3	DI4	Digital Input 4 / D latch	18	DI3	Digital Input 3 / C latch	33	DI5	Digital Input 5
4	DI7	Digital Input 7	19	DI6	Digital Input 6	34	DI8	Digital Input 8
5	ELO	Electronic Lock Out	20	ABRT	Abort Input	35	GND	Digital Ground
6	LSCOM0	Limit Switch Com (A-D)	21	N/C	No Connect	36	FLSA	Forward Limit Switch A
7	HOMA	Home Switch A	22	RLSA	Reverse Limit Switch A	37	FLSB	Forward Limit Switch B
8	HOMB	Home Switch B	23	RLSB	Reverse Limit Switch B	38	FLSC	Forward Limit Switch C
9	HOMC	Home Switch C	24	RLSC	Reverse Limit Switch C	39	FLSD	Forward Limit Switch D
10	HOMD	Home Switch D	25	RLSD	Reverse Limit Switch D	40	GND	Digital Ground
11	OP0A	Output GND/PWR	26	N/C	No Connect	41	DO1	Digital Output 1
12	DO3	Digital Output 3	27	DO2	Digital Output 2	42	DO4	Digital Output 4
13	DO6	Digital Output 6	28	DO5	Digital Output 5	43	DO7	Digital Output 7
14	OP0B	Output PWR/GND	29	DO8	Digital Output 8	44	CMP	Output Compare (A-D)
15	+5V	+5V	30	+5V	+5V			

J8 - I/O (E-H) 44 pin HD D-Sub Connector (Female)

4183

For DMC-4153 thru DMC-4183 controllers only.

Pin#	Label	Description	Pin#	Label	Description	Pin#	Label	Description
1	ERR	Error Output	16	RST*	Reset Input	31	GND	Digital Ground
2	DI9	Digital Input 9 / E latch	17	INCOM1	Input Common (DI 9-16)	32	DI10	Digital Input 10 / F latch
3	DI12	Digital Input 12/H latch	18	DI11	Digital Input 11 / G latch	33	DI13	Digital Input 13
4	DI15	Digital Input 15	19	DI14	Digital Input 14	34	DI16	Digital Input 16
5	ELO*	Electronic Lock Out	20	ABRT*	Abort Input	35	GND	Digital Ground
6	LSCOM1	Limit Switch Com (E-H)	21	N/C	No Connect	36	FLSE	Forward Limit Switch E
7	HOME	Home Switch E	22	RLSE	Reverse Limit Switch E	37	FLSF	Forward Limit Switch F
8	HOMF	Home Switch F	23	RLSF	Reverse Limit Switch F	38	FLSG	Forward Limit Switch G
9	HOMG	Home Switch G	24	RLSG	Reverse Limit Switch G	39	FLSH	Forward Limit Switch H
10	HOMH	Home Switch H	25	RLSH	Reverse Limit Switch H	40	GND	Digital Ground
11	OP1A	Output GND/PWR	26	N/C	No Connect	41	DO9	Digital Output 9
12	DO11	Digital Output 11	27	DO10	Digital Output 10	42	DO12	Digital Output 12
13	DO14	Digital Output 14	28	DO13	Digital Output 13	43	DO15	Digital Output 15
14	OP1B	Output PWR/GND	29	DO16	Digital Output 16	44	CMP	Output Compare (E-H)
15	+5V	+5V	30	+5V	+5V			

* ABRT, RST and ELO use INCOM0

Jn1 - Encoder 26 pin HD D-Sub Connector (Female)

Pin #	Label	Description	Pin #	Label	Description
1	HALC	Hall C	14	FLS	Forward Limit Switch Input
2	AEN	Amplifier Enable	15	AB+	B+ Aux Encoder Input
3	DIR	Direction	16	MI-	I- Index Pulse Input
4	HOM	Home	17	MB+	B+ Main Encoder Input
5	LSCOMn	Limit Switch Common*	18	GND	Digital Ground
6	AA-	A- Aux Encoder Input	19	MCMD	Motor Command
7	MI+	I+ Index Pulse Input	20	ENBL+	Amp Enable Power
8	MA-	A- Main Encoder Input	21	HALA	Hall A
9	+5V	+5V	22	RLS	Reverse Limit Switch Input
10	GND	Digital Ground	23	AB-	B- Aux Encoder Input
11	ENBL-	Amp Enable Return	24	AA+	A+ Aux Encoder Input
12	HALB	Hall B	25	MB-	B- Main Encoder Input
13	STP	PWM/Step	26	MA+	A+ Main Encoder Input

* LSCOMn on JA1, JB1, JC1 and JD1 is common to LSCOM0 on J5
LSCOMn on JE1, JF1, JG1 and JH1 is common to LSCOM1 on J8

J4 - Analog 15 pin D-sub Connector (Male)

Pin #	Label	Description
1	AGND	Analog Ground
2	AI1	Analog Input 1
3	AI3	Analog Input 3
4	AI5	Analog Input 5
5	AI7	Analog Input 7
6	AGND	Analog Ground
7	-12V	-12V
8	+5V	+5V
9	AGND	Analog Ground
10	AI2	Analog Input 2
11	AI4	Analog Input 4
12	AI6	Analog Input 6
13	AI8	Analog Input 8
14	N/C	No Connect
15	+12V	+12V

Communication with Galil Software

To communicate with the controller, the GalilTools communications software must first be installed. A free version of GalilTools (GalilTools-Lite) may also be used. These software applications can be found on the software installation CD shipped with the controller, or online at:

http://www.galilmc.com/support/software-downloads.php

Installation instructions for your operating system can be found in the GalilTools user manual.

http://www.galilmc.com/support/manuals/galiltools/introduction.html

Once the software has been installed, run GalilTools, or GalilTools-Lite and choose your controller.

USB connection

If you are using a USB connection, connect the DMC-41x3 USB port to your computer via a Male Type A – Male Type B USB cable. The port will be identified as a new Serial port. The USB port is designed for basic communication to the controller and the standard baud rate of the DMC-41x3 motion controller is 115200.

Ethernet connection

If you are connected to the controller via an Ethernet connection, and your network is DHCP enabled, then the controller will automatically have an IP addressed assigned to it. If your network is not DHCP enabled, or the connection is only between the PC and the controller, then the controller be found with the software as no IP address assigned. The GalilTools software will allow you to assign the controller with an IP address. See the GalilTools documentation for detailed information on using the software to assign the controller IP address.

Appendix – Specifications

A1 – Electrical Specifications

DMC-4183- D3240-D3240

Description	Units	Specification
Maximum Input Voltage	VDC	60
Minimum Input Voltage	VDC	20
Maximum Input Power	W	2400
Maximum Output Current	Amps	80

DMC-4183- D3540-D3540

Description	Units	Specification
Maximum Input Voltage	VDC	60
Minimum Input Voltage	VDC	20
Maximum Input Power	W	1920
Maximum Output Current	Amps	64

AMP-43240

Description	Units	Specification
Supply Voltage	VDC	20-60
Maximum Input Power	W	1200
Continuous Output Current per axis	Amps	10
Peak Output Current per axis	Amps	20
Amplifier Gain	A/V	0.5, 1.0 (default), 2.0
Switching Frequency	kHz	24
Brushless Motor Commutation angle	°	120
	°	60 (option available)
Supply Voltage Fuse	Amps	30

AMP-43540

Description	Units	Specification
Supply Voltage	VDC	20-60
Maximum Input Power	W	960
Continuous Output Current per axis	Amps	8
Peak Output Current per axis	Amps	15
Amplifier Gain	A/V	0.4, 0.8 (default), 1.6
Switching Frequency	kHz	33
Brushless Motor Commutation angle	°	120
Supply Voltage Fuse	Amps	30

Fault Information

The AMP-43240 and AMP-43540 are protected from the following fault conditions.

Fault Condition	AMP-43540	AMP-43240
Over-Current Protection	yes	yes
Under-Voltage Protection	yes	yes
Over-Temperature Protection	yes	yes
Over-Voltage Protection	yes	yes
Hall Error Detection	yes	yes

The Over-Current protection circuit is shown in Figure 17. For further specifics on fault conditions, see the DMC-41x3 User Manual.

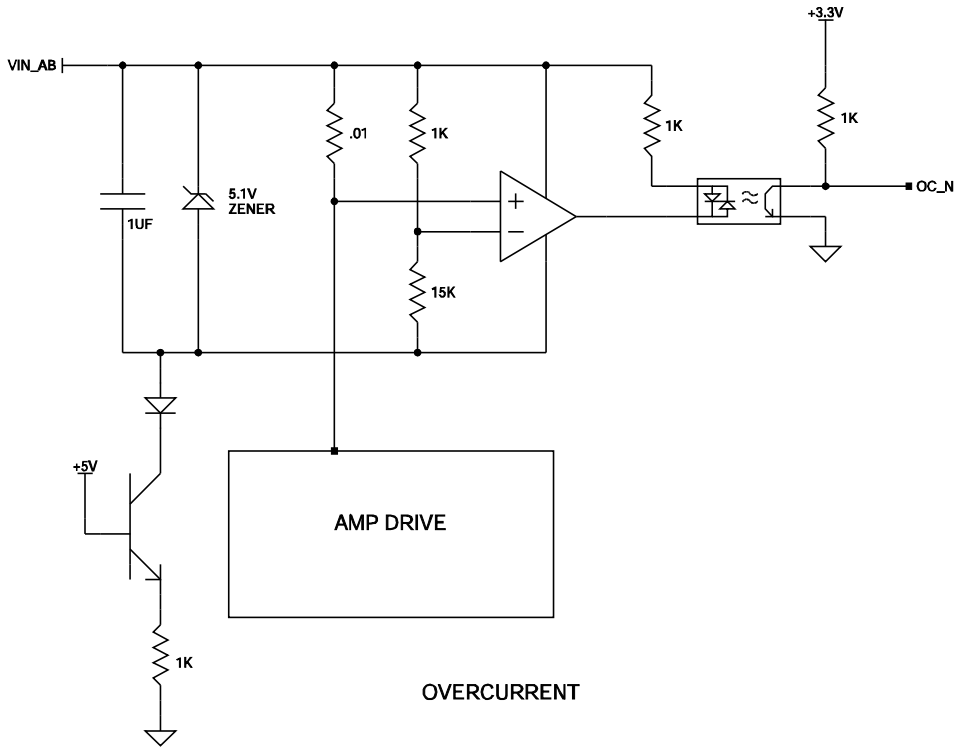


Figure 17: Overcurrent Circuit

A2 – Environmental Specifications

Description	Units	Specification
Storage Temperature	C	-40 to +125
Operating Temperature	C	0 to +40
Operating Altitude	feet	10,000
Humidity	RH	20-95% (non-condensing)

A3 – Mechanical Specifications DMC-4183

DMC-4183

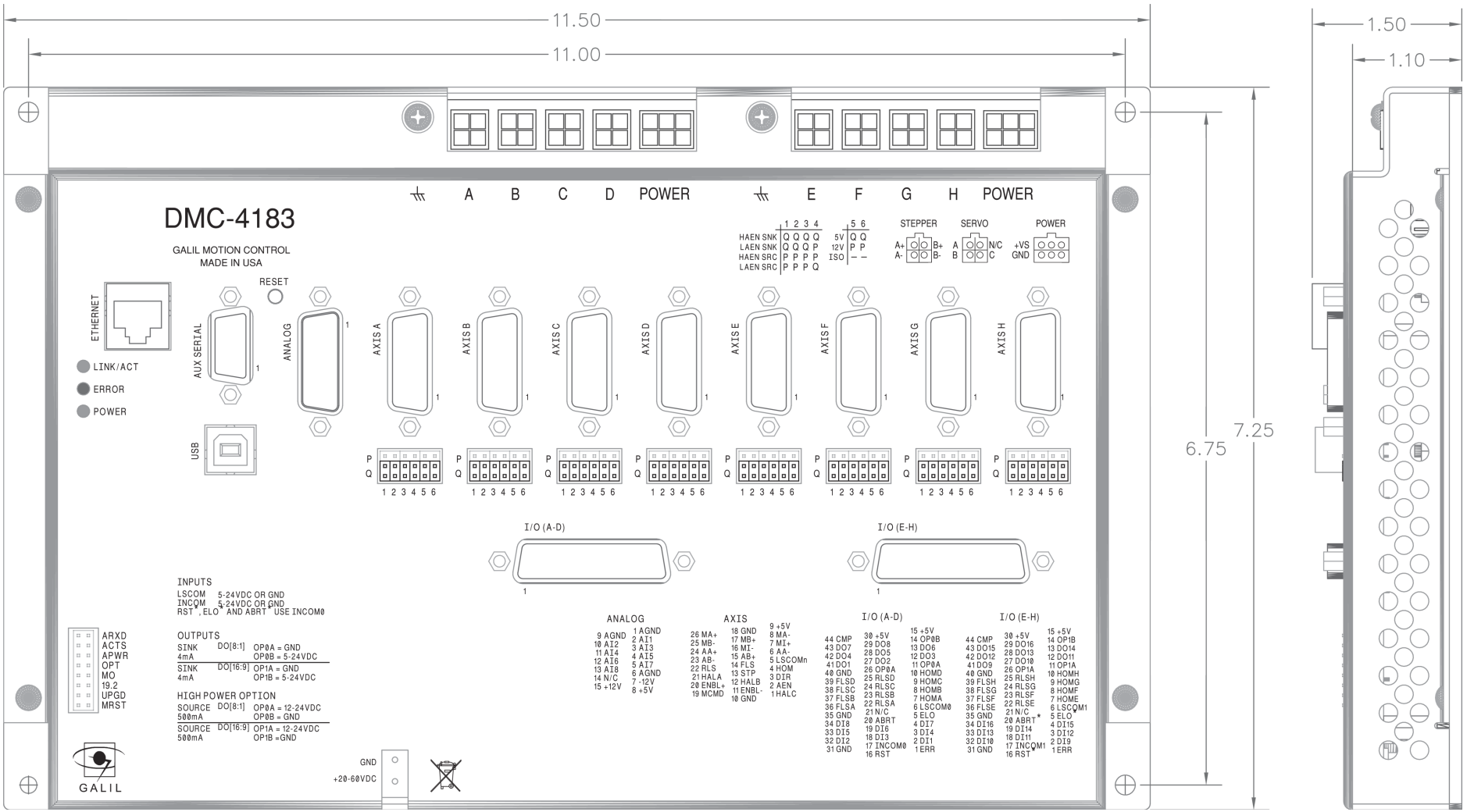
Description	Units	Specification
Weight	lb	4.25 (DMC-4183-D3240-D3240)
Length	in	11.50
Width	in	7.25
Height	in	1.50

DMC-4183- D3240-D3240

Included Components	Quantiy	Description
DMC-4183	1	Main Controller Board
AMP-43240	2	Servo Amplifier Board

DMC-4183- D3540-D3540

Included Components	Quantiy	Description
DMC-4183	1	Main Controller Board
AMP-43540	2	Servo Amplifier Board


11.50
11.00
1.50
1.10
6.75
7.25
DMC-4183
GALIL MOTION CONTROL
MADE IN USA
A B C D POWER
E F G H POWER
1 2 3 4 5 6
HAEN SNK Q Q Q Q 5V Q Q
LAEN SNK Q Q Q P 12V P P
HAEN SRC P P P P ISO – –
LAEN SRC P P P Q
STEPPER
SERVO
POWER
A+ B+ A N/C +VS
A- B- B C GND
RESET
ETHERNET
LINK/ACT
ERROR
POWER
AUX SERIAL
ANALOG
USB
AXIS A
AXIS B
AXIS C
AXIS D
AXIS E
AXIS F
AXIS G
AXIS H
P Q
1 2 3 4 5 6
I/O (A-D)
I/O (E-H)
INPUTS
LSCOM 5-24VDC OR GND
INCOM 5-24VDC OR GND
RST*, ELO* AND ABRT* USE INCOM0
OUTPUTS
SINK DO[8:1] OP0A = GND
4mA OP0B = 5-24VDC
SINK DO[16:9] OP1A = GND
4mA OP1B = 5-24VDC
HIGH POWER OPTION
SOURCE DO[8:1] OP0A = 12-24VDC
500mA OP0B = GND
SOURCE DO[16:9] OP1A = 12-24VDC
500mA OP1B =GND
ARXD
ACTS
APWR
OPT
MO
19.2
UPGD
MRST
GND
+20-60VDC
GALIL
ANALOG
9 AGND 1 AGND
10 AI2 2 AI1
11 AI4 3 AI3
12 AI6 4 AI5
13 AI8 5 AI7
14 N/C 6 AGND
15 +12V 7 -12V
8 +5V
AXIS
26 MA+ 18 GND 9 +5V
25 MB- 17 MB+ 8 MA-
24 AA+ 16 MI- 7 MI+
23 AB- 15 AB+ 6 AA-
22 RLS 14 FLS 5 LSCOMn
21 HALA 13 STP 4 HOM
20 ENBL+ 12 HALB 3 DIR
19 MCMD 11 ENBL- 2 AEN
10 GND 1 HALC
I/O (A-D)
44 CMP 30 +5V 15 +5V
43 DO7 29 DO8 14 OP0B
42 DO4 28 DO5 13 DO6
41 DO1 27 DO2 12 DO3
40 GND 26 OP0A 11 OP0A
39 FLSD 25 RLSD 10 HOMD
38 FLSC 24 RLSC 9 HOMC
37 FLSB 23 RLSB 8 HOMB
36 FLSA 22 RLSA 7 HOMA
35 GND 21 N/C 6 LSCOM0
34 DI8 20 ABRT 5 ELO
33 DI5 19 DI6 4 DI7
32 DI2 18 DI3 3 DI4
31 GND 17 INCOM0 2 DI1
16 RST 1 ERR
I/O (E-H)
44 CMP 30 +5V 15 +5V
43 DO15 29 DO16 14 OP1B
42 DO12 28 DO13 13 DO14
41 DO9 27 DO10 12 DO11
40 GND 26 OP1A 11 OP1A
39 FLSH 25 RLSH 10 HOMH
38 FLSG 24 RLSG 9 HOMG
37 FLSF 23 RLSF 8 HOMF
36 FLSE 22 RLSE 7 HOME
35 GND 21 N/C 6 LSCOM1
34 DI16 20 ABRT* 5 ELO*
33 DI13 19 DI14 4 DI15
32 DI10 18 DI11 3 DI12
31 GND 17 INCOM1 2 DI9
16 RST* 1 ERR

A4 – Mechanical Specifications DMC-4143

Description	Units	Specification
Weight	lb	2.7 (DMC-4143-D3240)
Length	in	8.05
Width	in	7.25
Height	in	1.50